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EXAMINER	
TRINH, MICHAEL MANH	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/714,207	CHIU ET AL.	
	Examiner	Art Unit	
	Michael Trinh	2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 March 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2 and 5-10* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2 and 5-10* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

*** This office action is in response to Applicant's Amendment/Response filed March 08, 2007. Claims 1-2,5-10 are pending. Claims 3-4,11-39 were canceled.

*** The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 102 and/or 103

1. Claims 1,5 are rejected under 35 U.S.C. 102(b) as anticipated by Yeh et al (6,207,565).

Yeh et al teach (at Fig 9, col 6, lines 38-67; col 7, lines 1-47; col 5, lines 50-67; col 4, lines 28 through col 5; Figs 1-8 and related text) an integrated process flow involving a patterned photoresist layer 208 on a substrate 102 in an etching tool that has one or more process chambers, said patterned photoresist layer 208 having an opening with a top and bottom that extends through at least one underlying layer 104 in said substrate 102, comprising: (a) performing an oxygen plasma ashing step to remove said patterned photoresist layer 208 (Figs 9, col 6, lines 47-55; col 2, lines 38-54; col 1, lines 35-53); (b) cleaning a residue from the opening by performing a halogen containing plasma step, in which oxide etch by using a dry plasma etch, such as CF_4, to remove the oxide that grew onto the semiconductor substrate (col 6, lines 56 through col 7; Fig 9; col 2, lines 38-54; col 1, lines 35-53) ; and (c) after dry plasma etch to clean the residues, etching the cleaned opening in the substrate by performing a CF_4/H_2O plasma in the substrate (col 6, line 64 through col 7; col 6, lines 38-67; col 7, lines 1-47; col 5, lines 50-67; col 4, lines 28 through col 5,), wherein an inductively-coupled plasma chamber of the Mattson Aspen ashing system (col 7, lines 17-32; and col 5, lines 39-67, col 6, lines 38-67, col 7, lines 1-47; Figs 1-9) is mentioned and employed for carried out the invention, wherein Yeh teaches (at Table I, Figure 6; col 4, lines 28-67) the steps (a), (b), and (c) are performed in the same process plasma chamber of the etching tool by introducing or stopping of the plasma into the same inductively-coupled plasma chamber of the Mattson Aspen ashing system, and thereby apply the same to carry out the process steps as recited in Figure 9. Re claim 5, wherein the halogen containing plasma step involves a plasma of CF_4, CHF_3, C_2F_6, which plasma satisfies $C_xF_yH_z$ where x and y are integers and z is an integer or is 0 (col 6, lines 56-63; col 7, lines 7, lines 22-25).

Claim Rejections - 35 USC § 103

2. Claims 1,5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (6,025,273) in view of Yeh et al (6,207,565) and Yang et al (6,221,772).

Chen teaches an integrated process flow involving a patterned photoresist layer 18 on a substrate 12/10 in an etching tool that has one or more process chambers, said patterned photoresist layer 18 having an opening with a top and bottom that extends through at least one underlying layer 16 in said substrate, comprising: (a) performing an oxygen ashing step to remove said patterned photoresist layer 18 (Figs 3-4; col 4, lines 51-65); and (c) etching the opening in the substrate to transfer the opening through an exposed layer at the bottom of the opening in said substrate (Fig 5, col 5, lines 1-20). Re claim 5, wherein said halogen containing plasma step involves a plasma of CF_4, CHF_3, C_2F_6, which plasma satisfies $C_xF_yH_z$, where x and y are integers and z is an integer or is 0 (col 4, lines 64 through col 5, line 5). Chen also teaches (at col 4, lines 55-67) the etching tool including reactive ion etching (RIE) or a HDP etcher.

Re claim 1, Chen lacks cleaning a residue from the opening by performing a halogen containing plasma after oxygen ashing to remove the photoresist layer, and lacks mentioning to perform the steps in the same process chamber of the etching tool.

However, Yeh teaches (at col 6, lines 38 through col 7; Fig 9; col 2, lines 38-54; col 1, lines 35-53) cleaning to remove residues from the opening by performing a halogen containing plasma after oxygen ashing to remove the photoresist layer, since residues are existed on the substrate. Yeh also teaches, at Table I of Figure 6 (Figure 9, col 6, lines 47-67, col 7, col 5, lines 50-67), that these steps are performed in the same process chamber of the etching tool by introducing or stopping of the plasma (see Table I, Figure 6) into the inductively-coupled plasma chamber of the Mattson Aspen ashing system, in which Yeh teaches after performing an oxyen plasma ashing to remove the photoresist, performing a halogen plasma etching step to clean residue, and performing a plasma etching to the cleaned opening, wherein the same single inductively-coupled plasma chamber is used for ashing and etching. Yang et al also teaches (at Figs 5-8; col 3, line 10 through col 4, line 26) performing in-situ plasma ashing steps and in-situ plasma etching steps in the same process chamber of the etching tool (col 4, lines 6-18; and col 3, line 39 through col 4, line 26).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to fabricate the semiconductor process flow involving a patterned photoresist layer of Chen by performing a halogen containing plasma to clean and remove residues from the opening after oxygen ashing to remove the photoresist layer, as taught by Yeh. This is because of the desirability to clean and remove residues from the substrate. This is also because of the desirability to prepare a semiconductor substrate which does not allow residues to become trapped on the semiconductor substrate so that other subsequent processes can be surely carried out in a reliable manner, thereby a high quality semiconductor device can be effectively manufactured. Additionally, it would have been obvious to one of ordinary skill in the art at the time the invention was made to perform the steps of oxygen ashing, halogen plasma, and etching opening of Chen by using the same plasma process chamber of the etching tool, as taught by Yeh and Yang above. This is at least because of the desirability to allow a number of steps to be performed in the same plasma chamber, less expensive, and reduce production and equipment cost, wherein manufacturing of an electronic device is simpler since only a single tool is needed for performing a number of steps.

3. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (6,025,273) and Yeh et al (6,207,565) and Yang et al (6,221,772), as applied to claims 1,5 above, taken with Shan et al (6,232,236) and Levenson et al (2001/0038089).

The references including Chen and Yeh teach an integrated process flow involving a patterned photoresist layer 18 as applied to claims 1 and 5 above.

Re claim 2, the references including Chen lacks listing etching tool being a split power etcher, a dual power etcher, a single power etch tool, a reactive ion etcher, or a conventional barrel, direct, or downstream type of ashing tool.

However, Shan teaches (at col 5, lines 11-29; col 3, lines 46-55; col 4, lines 15-35) etching tool including a split power etcher, a dual power etcher, a single power etch tool, a reactive ion etcher. Levenson teaches (at col 4, paragraph 46; paragraphs 5-12) plasma ashing tool including down flow, barrel, direct, and downstream type of ashing tool. Chen also teaches (at col 4, lines 55-67) the etching tool including reactive ion etching (RIE) or a HDP etcher.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to perform the oxygen ashing and halogen plasma step of Chen by employing the etching tool of a split power etcher, a dual power etcher, a single power etch tool, a reactive ion etcher, or a barrel, direct, or downstream type of ashing tool, as taught by Shan and Levenson. This is because these tools are alternative and art recognized equivalent tools so that the plasma ashing and etching steps can be effectively performed in a reliable manner.

4. Claim 5-6 are further rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (6,025,273), Yeh et al (6,207,565) and Yang et al (6,221,772), as applied to claims 1,5 above, taken with Hayasaka et al (5,298,112) and Hori et al (5,411,631).

The references including Chen, Yeh, and Yang teach an integrated process flow involving a patterned photoresist layer 18 as applied to claims 1 and 5 above. Re claims 5-6, Chen already teaches (at col 4, lines 58 through col 5, line 5) halogen containing plasma including Cl_2, HBr, CF_4.

The references including Chen do not list all halogen plasma as recited in claim 5, the plasma includes CF_4, CH_2F_2, SF_6, NF_3, Cl_2 and $C_xF_yH_z$ where x and y are integers and z is an integer or is 0; and Re claim 6, HBr is included in combination with the above halogen plasma.

However, Hori teaches (at col 5, lines 36-54) halogen containing plasma including CF_4, NF3, SF_6, Cl_2, CHF_3, in which $C_xF_yH_z$ where x and y are integers and z is an integer or is 0, wherein HBr is included in combination with the plasma including Cl_2. Chen already teaches (at col 4, lines 58 through col 5, line 5) halogen containing plasma including Cl_2, HBr, CF_4.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to perform the halogen containing plasma step of Chen by employing available known halogen containing plasma including of CF_4, CH_2F_2, SF_6, NF_3, Cl_2 and $C_xF_yH_z$ where x and y are integers and z is an integer or is 0, with HBr included in the halogen plasma, as taught by Hori and Chen. This is because these halogen containing plasma are alternative and art recognized equivalent plasma etchants so that unwanted residues and material can be effectively removed from the substrate in a reliable manner.

5. Claims 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (6,025,273), Yeh et al (6,207,565) and Yang et al (6,221,772), as applied to claims 1,5 above, taken with Webb et al (5,228,950).

The references including Chen, Yeh, and Yang teach an integrated process flow involving a patterned photoresist layer 18 as applied to claims 1 and 5 above.

Re claims 7-8, Chen already teaches (at col 4, lines 55-67) using reactive ion etching (RIE) or a HDP etcher for performing the halogen containing plasma step, but lacks detail about process parameters of flow rate, pressure, temperature, power, time period, as recited in claims 7-8.

However, Yeh also teaches (at Fig 6, Table I, Step 2) performing a halogen containing plasma step, with a gas flow rate of about 360 standard cubic centimeters per minute (sccm), a chamber pressure about 0.5 Torr, a chamber temperature of about 250 degree C, a RF power of about 975 Watts, and for a period of less than about 2 seconds. Webb teaches (at col 3, line 9 through col 4, lines 60) performing a NH_3-halogen containing plasma step, with a gas flow rate of about 10-500 standard cubic centimeters per minute (sccm; col 3, lines 23-40), a chamber pressure about 20 milliTorr to about 1Torr (col 3, lines 9-22), a chamber temperature of about 25 to 150 degree C, a RF power ranging of about 50-400 Watts, and for a period of about 5-60 seconds (col 4, lines 1-5, 51-60).

Therefore, the subject matter as a whole would have been obvious to one or ordinary skill in the art at the time the invention was made to select the portion of the prior art's range flow rate, temperature, a RF power ranging for top RF power and bias RF power, pressure, time period, etc., as taught by Yeh and Webb, and known in the art, which is within the range of applicant's claims, because it has been held to be obvious to select a value in a known range by optimization for the best results, and would be an unpatentable modification, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation". *In Re Aller* 104 USPQ 233,255 (CCPA 1955); *In re Waite* 77 USPQ 586 (CCPA 1948); *In Re Swanson* 56 USPQ 372 (CCPA 1942); *In Re Sola* 25 USPQ 433 (CCPA 1935); and *In Re Dreyfus* 24 USPQ 52 (CCPA 1934).

6. Claims 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al (6,025,273), Yeh et al (6,207,565) and Yang et al (6,221,772), as applied to claims 1,5 above, taken with Verhaverbeke et al (2003/0045098).

The references including Chen, Yeh and Yang teach an integrated process flow involving a patterned photoresist layer 18 as applied to claims 1 and 5 above.

The references including Chen already teaches using the patterned photoresist layer 18 during semiconductor fabrication, wherein, the opening exposes an underlying silicon layer 12 and step (c) forms a shallow trench in the silicon layer 12 (Figs 7,5; col 5, lines 1-49).

Chen thus lacks mentioning his method for forming a shallow trench in the substrate (claim 9); and for forming a gate electrode (claim 10).

However, Verhaverbeke teaches (at Figs 16A-16C) applying the method for forming a shallow trench in the substrate (claim 9), wherein the method is also applied (at Figs 15A-15E) for forming a gate electrode (claim 10).

Therefore, it would have been obvious to one or ordinary skill in the art at the time the invention was made to apply the method of Chen for removing residues during the formation of a shallow trench in the substrate and during the formation of a gate electrode, as taught by Verhaverbeke. This is because of the desirability to eliminate unwanted residues from the substrate so that a high quality integrated device can be manufactured in a reliable manner.

Response to Amendment

7. Applicant's argument filed March 08, 2007 have been fully considered but they are not found persuasive.

** Regarding Applicant's remarks at remark page 2 to page 4:

Applicant generally alleged (at last paragraph of page 3 to page 4) that

"...Yeh discloses several different embodiments, and the Office Action selectively extracts isolated elements from at least three of these embodiments....the Office Action...rejection of Claim 1 is explained in the last paragraph on page 2, and this explanation includes citations to all three of these embodiments...

:

The Office Action does not take the position that one of these three different embodiments contains all of the elements that are recited in Applicant's Claim 1. In other words, the Examiner has not established that one embodiment of Yeh, considered by itself,..."

In response, this is noted and found totally unconvincing. Nowhere in the Office Action selectively extracts isolated elements from at least three of these embodiments. The fact that the Office Action points out different Figures, Columns, and Lines in order to help Applicants to find the elements buried within the reference does not the same mean as the office action selectively extracts isolated elements from these embodiments. In order to understand what is described and shown in Figure 9 for the last embodiment, a reader has to read the entire disclosure of Yeh reference of 6,207,565, and its related text including the discussion in the Background Art and other incorporated first embodiment as described and shown in Figures 1-8.

It is the fact that the office action is relied on **one** embodiment of Figure 9 and its related texts. Indeed, Applicant submitted (at remark page 5, lines 10-11) that

> "Of the various different embodiment disclosed in Yeh, **the Examiner seems to rely primarily on the embodiment shown in Figure 9**...".

Accordingly, Applicant's arguments are unfounded and without merit.

*** Regarding 35 USC102 Rejection of Claim 1, as anticipated by Yeh et al (6,207,565):

Applicant's remarks at remark page 4, last paragraph to page 6, first paragraph, are noted. Applicant alleged (at remark page 5) that:

> ...In Figure 9, block 904 shows an oxygen ashing step...The Examiner is apparently asserting that block 904 is comparables to step (a) in Applicant's Claim 1...In blocks 906 and 908, Yeh carries out two different steps to remove contaminants (310 in Figure 3) that were formed during oxygen ashing in block 904. The Examiner is apparently asserting that blocks 906 and 908 are comparable to step (b) in Claim 1...
>
> It should be noted that, after blocks 906 and 908, Yeh does not show any subsequent step that involves etching of any other structures. In other words, Figure 9 does not show any process comparable to step (c) of Claim 1...".

In response, this is noted and found totally unconvincing. It is disagreed with Applicant's allegation.

Regarding Applicant's remarks about the blocks in Figure 9 of Yeh, the office action is relied on the step of performing an oxygen plasma ashing step to remove said patterned photoresist layer 208 (block 904 of "O_2 Plasma Ash for Photoresist Removal"), as to read on

step (a) in Applicant's Claim 1. In the same Figure 9, the office action is relied on the step of cleaning a residue from the opening by performing a halogen containing plasma step, in which oxide etch by using a dry plasma etch, such as CF_4, to remove the oxide that grew onto the semiconductor substrate (block 906 of "Additional Oxide etch"), as to read on step (b) in Applicant's Claim 1. In the same Figure 9, the office action is relied on the step of , after dry plasma etch to clean the residue above (i.e. after block 906 of "Additional Oxide Etch"), etching the cleaned opening in the substrate by performing a CF_4/H_2O plasma in the substrate (block 908 of "Ashing for Contaminant Removal"), as to read on step (c) in Applicant's Claim 1. Accordingly, Yeh clearly teaches steps (a), (b) and (c) in Applicant's claim 1. Yeh teaches using an inductively couple plasma chamber of the plasma process Mattson Aspen ashing system for carrying out these steps shown in the blocks, wherein the same inductively-coupled plasma chamber of the Mattson Aspen ashing system is employed for carried out of the invention (col 7, lines 17-32; and col 5, lines 39-67, col 6, lines 38-67, col 7, lines 1-47; Figs 1-9). As shown at Table I, Figure 6 of Yeh (col 4, lines 28-67), these steps are performed by using the same process plasma chamber of the etching tool by introducing or stopping of the plasma into the same inductively-coupled plasma chamber of the Mattson Aspen ashing system, and thereby apply the same to carry out the process steps as recited in Figure 9 by simply introducing or stopping of the plasma. Moreover, in steps 904 and 906 of Figure 9, rather using pure O_2 plasma to remove photoresist and separate oxide etch step, a mixture of O_2 plasma and an oxide etchant such as CF_4 is used to simultaneously etch oxide to ash the photoresist mask, by using the same inductively-couple plasma chamber (Fig 9, col 7, lines 1-47; col 6, lines 38-55;), and thereafter etching and ashing to remove contaminant by introducing H_2O and CF_4, using the same inductively-coupled plasma chamber (col 7, lines 17-32,1-47; Fig 9).

* Applicant further alleged that "Yeh does not show any subsequent step that involves etching of any other structures. In other words, Figure 9 does not show any process comparable to step (c) of Claim 1...".

In response, this is noted and found unconvincing. First, step (c) of Applicant's claim 1 merely recite "etching said cleaned opening in said substrate". Etching of "any other structures" is not found in the claims. Claimed subject matter, not the specification, is the measure of

invention. Limitations in the specification cannot be read into the claims for the purpose of avoiding the prior art. In Re Self, 213 USPQ 1,5 (CCPA 1982); In Re Priest, 199 USPQ 11,15 (CCPA 1978). Second, in any event, in Figure 9 of Yeh, after dry plasma etch to clean the oxide residue (i.e. after block 906 of "Additional Oxide Etch"), block 908 ("Ashing for Contaminant Removal") is subsequently performed in order to etch and remove the contaminants by etching the cleaned opening in the substrate using a CF_4/H_2O plasma, in which the contaminants (i.e. comparable to "any other structures" as alleged above by Applicant) are removed and etched away from the substrate. Accordingly, Yeh already teaches and show a step that involves etching of any other structures, as alleged and claimed by Applicants.

*** Regarding 35 USC 103 Rejection of Claim 1 by Yeh et al (6,207,565) reference:

It is noted Applicant's remarks (at remark page 6 to page 7) about the 103 rejection of claim 1 by using Yeh reference.

This ground of 103 rejection is withdrawn, as unnecessary, in view of the 35 USC 102 rejection above of Yeh reference.

*** Regarding 35 USC 103 Rejection of Claim 1 by Chen, Yeh, and Yang:

Applicant mainly remarked (at remark page 8 to page 10) that "...steps 4 and 5 of Figure 6 of Yeh constitute an oxygen ashing process that removes a photoresist...However, Figure 6 of Yeh does not show two additional steps that are carried out after steps 4 and 5, and that are comparable to steps (b) and (c) in Applicant's Claim 1...".

In response, this is noted and found unconvincing. Figure 6 is used as an evidence to show that all of the steps are performed by using the same inductive-coupled plasma chamber. Applicant appears to misunderstand about Yeh does not show two additional steps that carried out after steps 4 and 5.

Carrying out these process steps (or blocks) as shown in Figure 9 of Yeh would have been obvious and within the level of one of ordinary skill in the art by simply introducing or stopping of the plasma into the same inductively-coupled plasma chamber of the Mattson Aspen ashing system, as further evidently shown in Figure 6. In Figure 9 of Yeh, the office action is

relied on the step of performing an oxygen plasma ashing step to remove said patterned photoresist layer 208 (block 904 of "O_2 Plasma Ash for Photoresist Removal"), as to read on step (a) in Applicant's Claim 1. In the same Figure 9, the office action is relied on the step of cleaning a residue from the opening by performing a halogen containing plasma step, in which oxide etch by using a dry plasma etch, such as CF_4, to remove the oxide that grew onto the semiconductor substrate (block 906 of "Additional Oxide etch"), as to read on step (b) in Applicant's Claim 1. In the same Figure 9, the office action is relied on the step of , after dry plasma etch to clean the residue above (i.e. after block 906 of "Additional Oxide Etch"), etching the cleaned opening in the substrate by performing a CF_4/H_2O plasma in the substrate (block 908 of "Ashing for Contaminant Removal"), as to read on step (c) in Applicant's Claim 1. Yeh teaches using an inductively couple plasma chamber of the plasma process Mattson Aspen ashing system for carrying out these steps shown in the blocks, wherein the same inductively-coupled plasma chamber of the Mattson Aspen ashing system is employed for carried out of the invention (col 7, lines 17-32; and col 5, lines 39-67, col 6, lines 38-67, col 7, lines 1-47; Figs 1-9). As shown at Table I, Figure 6 of Yeh (col 4, lines 28-67), these steps are performed by using the same process plasma chamber of the etching tool by introducing or stopping of the plasma into the same inductively-coupled plasma chamber of the Mattson Aspen ashing system, and thereby apply the same to carry out the process steps as recited in Figure 9 by simply introducing or stopping of the plasma. Moreover, in steps 904 and 906 of Figure 9, rather using pure O_2 plasma to remove photoresist and separate oxide etch step, a mixture of O_2 plasma and an oxide etchant such as CF_4 is used to simultaneously etch oxide to ash the photoresist mask, by using the same inductively-couple plasma chamber (Fig 9, col 7, lines 1-47; col 6, lines 38-55;), and thereafter etching and ashing to remove contaminant by introducing H_2O and CF_4, using the same inductively-coupled plasma chamber (col 7, lines 17-32,1-47; Fig 9).

The references including Yeh and Yang teach using the same plasma process chamber for performing a number of steps including oxygen plasma ashing and plasma etching, in which Yeh teaches after performing an oxyen plasma ashing to remove the photoresist, performing a halogen plasma etching step to clean residue, and performing a plasma etching to the cleaned opening, wherein the same single inductively-coupled plasma chamber is used for ashing and etching. Therefore, the combined references clearly establish a prima facie case of obivouness

with reasonable expectation of success to perform and carry out these plasma ashing and plasma etching by using the same plasma chamber. This is at least because of the desirability to reduce production and equipment cost since only the same single inductively-coupled plasma chamber of the Mattson Aspen ashing system, and because of the desirability to allow a number of steps to be performed in the same plasma chamber, less expensive, wherein manufacturing of an electronic device is simpler since only a single tool is needed for performing a number of steps.

Accordingly, the rejections are outstanding and maintained.

****

Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

****

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael M. Trinh whose telephone number is (571) 272-1847. The examiner can normally be reached on M-F: 9:00 Am to 5:30 Pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith can be reached on (571) 272-2429. The central fax phone number is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Oacs-9

Michael Trinh
Primary Examiner